A Systematic Approach to Laboratory Safety

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Hazards Control Department
Lawrence Livermore National Laboratory

About LLNL

- Performs research, development, and testing for DOE and other clients.
- Major focus areas are national security, energy and environmental systems, and bioscience.
- Annual budget about $1 billion.
- Projects range from 10's of $K to $multimillion.
- About 10,000 workers, 1000 labs and shops.

About LLNL chemical laboratory operations

Research Directorates (partial)

- Chemistry and Materials Science
- Physics and Space Technology
- Engineering
- Lasers
- Biomedicine and Biotechnology
- Environmental Research

Activities

- high explosives synthesis
- biochemistry
- sample analysis and testing
- polymer development
- materials science
- earth and atmospheric science

A Systematic Approach to Laboratory Safety

Overview of LLNLs approach:

- Identify responsible individual for each activity.
- Identify components of the work process.
- One stop shopping for ES&H support.
- Provide tools to simplify and enhance ES&H performance.
- Plug away at it.

The goal: Increase productive work; reduce injuries and ineffective time

Systematic ES&H Enhancement—The whole package

- Overall, this has been our Integrated Safety Management System

- Follows the CQI 4 step process

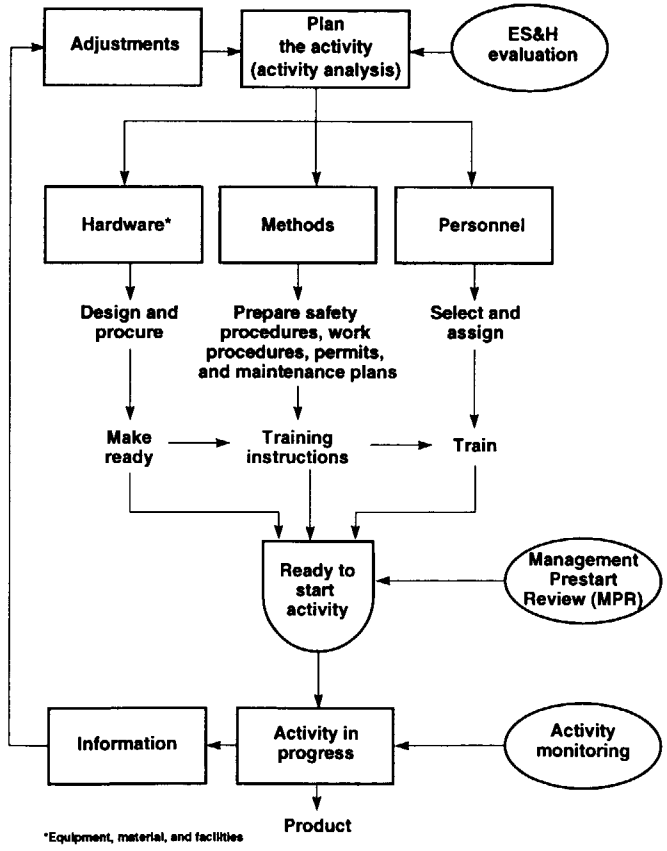
  1. Plan—Plan the Work

     -Conduct an ES&H Evaluation
     -Implement Controls
     -Prestart Review

  2. Do—Do Work Safely

  3. Check—Evalute effectiveness

  4. Act—Improve as necessary



Enhancing ES&H Performance: Primary Method - Integrate ES&H Systematically

- First screening—Integrated Worksheet/Project Work Plan/PHA
- ES&H Team for one stop shopping

  Opportunity to consult with safety staff while planning experiment; subject matter expert on each topic; coordinated response through the Team structure.

- Prepare safety procedures
  Entire facility/Specific operation
- Management Involvement—approve Safety Procedure, Prestart Review
- Self-Assessment/Deftrack

ES&H Integration Worksheet

To: (Program facility manager)		Date:
From: (Responsible individual)	Ext.:	L-Code:
Organization:		
Location of proposed activity: Bldg. Room		Start Date: Completion Date:
Emergency notification (Name/phone): Alternate:		
Activity/operation type: [ ] Attended [ ] Unattended	Percentage of time: _____% Percentage of time: _____%	
Name of proposed activity/operation/project:		
Description of proposed activity/operation/project (attach diagrams, floorplans, etc., if needed for clarity):		
Names of qualified personnel assigned to this activity/operation/project (attach additional sheets if necessary):		

The proposed new activity or change to an existing activity (check **all** that apply):

- [ ] is not covered under the umbrella of the *Health & Safety Manual*, the *Environmental Compliance Manual*, or by an OSP or FSP;
- [ ] increases the hazard, requires or modifies a permit, increases hazardous waste, modifies the environmental impact, or involves new or modified pollution abatement devices;
- [ ] involves special and unusual activities (i.e., aviation, firearms, offsite locations, non-LLNL personnel);
- [ ] involves decontamination, decommissioning, major building renovation, demolition, or ground-disturbance activities;
- [ ] will require medical surveillance by the Health Services Department or personal monitoring by the Hazards Control Department;
- [ ] involves installation of safety systems requiring maintenance.

or

As the responsible individual, I believe the proposed new activity (check one only):

- [ ] is a common laboratory or industrial activity that does not require any additional safety review, procedure, or environmental review;
- [ ] is adequately covered by the existing documentation below, which will be required reading for all individuals participating in this activity (attach additional sheets if necessary);

  _____

  _____

- [ ] is covered by existing documentation; however, I do not know if such documentation adequately covers the activity.

Complete reverse side, sign, and send to your facility manager.

The proposed activity involves the following (check **all** that apply).

[ ] A special nuclear material, accountable radioactive source, explosive, beryllium, other controlled material*	[ ] A location close to an identified cultural resource at Site 300
[ ] A fissile material not listed previously*	[ ] A cryogenic material not listed previously*
[ ] A radioactive material or radioactive source not listed previously*	[ ] An irritant*
[ ] An operation involving an accelerator	[ ] Equipment or oil contaminated with mercury or other hazardous material (i.e., polyclorinated biphenyl [PCB])*
[ ] A radiation-producing machine other than an accelerator	[ ] A pressure system above 150 psia
[ ] Ionizing radiation	[ ] Work on exposed, energized electrical equipment above 50 V or 20 A, or an operation using portable equipment at other than ground potential
[ ] An open beam operation	[ ] A capacitor
[ ] Activated or radioactivity contaminated equipment	[ ] A vacuum system
[ ] An interlock or interlock bypass	[ ] Magnetic fields, microwaves, or radiofrequency
[ ] A Class IV laser, or two or more Class III lasers in the same area	[ ] A physical hazard (noise, high temperature, cranes, forklifts, heavy equipment)
[ ] A Class III laser operated by a non-LLNL employee	[ ] Unusual equipment requiring special training/ considerations (e.g., firearm, boat, scuba diving)*
[ ] A laser not listed previously	[ ] Work above 20 ft, a unique crane lift, or crane repair with an operator on the bridge
[ ] A laser dye	[ ] An aviation operation with airplanes, balloons helicopters, rockets, or model airplanes
[ ] An unstable material or mock explosive not listed*	[ ] A mobile equipment vehicle (unmodified Department of Transportation [DOT] approved automobiles and trucks excluded)
[ ] A biohazard or human fluid	[ ] Machine tools or power-actuated tools
[ ] A chemical laboratory	[ ] An activity conducted at an offsite location (governing ES&H program needs to be evaluated)
[ ] Over 50 gal. of a flammable, volatile or fuming material*	[ ] An activity which affects ES&H of other activities or equipment
[ ] A toxic or pyrophoric gas, compressed gas, hydrogen gas, fluorine gas, or asphyxiant*	[ ] A radioactive, hazardous, or mixed waste*
[ ] An organic solvent, volatile organic material, or an ozone-depleting material (e.g., freon) not listed previously*	[ ] A discharge to the ground, air, sewer, retention tank, or storm water (list discharges, source location, where discharged, and estimated quantities)*
[ ] An extremely hazardous material (e.g., beryllium, alkali metal powders, fluorine compounds, mercury, chemical toxins) not listed elsewhere*	[ ] A variance from an external regulatory agency (i.e., the Department of Energy [DOE], Bay Area Air Quality Management District [BAAQMD], the Environmental Protection Agency [EPA])
[ ] A hazardous carcinogenic, mutagenic, teratogenic, or otherwise toxic material not listed elsewhere*	[ ] A structure or disturbance in a drainage channel, arroyo, or East Gate flood plain area
[ ] A flammable, combustible, corrosive, pyrophoric, water reactive, oxidizing, or peroxide-forming material not listed previously*	[ ] Safety systems requiring maintenance
[ ] Movement of large machine tools or equipment	[ ] A glovebox activity involving sharp or potentially sharp objects
[ ] Use of respirators, safety glasses or faceshields, safety shoes or shoe covers, hardhats, or gloves	[ ] Other _____*
[ ] Ground disturbance	
[ ] Activity not discussed in 1992 EIS/EIR or other DOE-NEPA document	

***List material and quantities, and attach to this worksheet.**

_____ _____

Responsible individual signature **Date**

[redacted] requires review by the ES&H team before authorization to proceed.

[redacted] authorized to proceed.

_____ _____

Facility manager signature **Date**

Copies to: Assurance manager, ES&H team leader, responsible individual

C&MS Project Work Plan

Version 2.1a
Jan. 27, 1997

The Chemistry and Materials Science Project Work Plan (PWP) is used to describe a proposed activity or a substantive change to an existing activity. A PWP is applicable to any work carried out in C&MS facilities or funded by C&MS programs. The purpose for a PWP is to document that all reviews for a project (ES&H, training, budget, QA, appropriateness, etc.) have been completed and that permission to begin an activity has been given. You may not begin work until the PWP has been signed by the authorizing authority

For all projects, Environmental, Safety and Health controls are specified in the LLNL *Health & Safety Manual*, the LLNL *Environmental Protection Handbook*, and Facility Safety Procedures. Anything outside of the scope of these documents requires a Operational Safety Procedure (OSP).

The Project Work Plan is not a substitute for an Operational Safety Procedure.

A PWP will generally be required for all new work or substantive changes to existing work. As examples, a PWP is required when:

1) you are going to use hazardous chemicals or materials that:
   a.) have not been reviewed previously, or
   b.) in a significantly increased quantity
2) your experiment has a physical hazard, such as high voltage, high pressure, or other source of a significant amount of stored energy, or
3) the conditions of the work place will change (moving an existing operation to a new location or moving different activities into your existing location), or
4) you will have air emissions or waste discharges that have not been previously reviewed.

If you have any question whether a PWP is needed, you should ask your Division Management or the Facility Manager.

As an experimenter, project leader or activity leader (requestor), it is your responsibility to fill out a PWP and submit it to your Division Leader (for C&MS employees) or the Facility Manager (for non-C&MS employees). These individuals will review the activities to ensure that adequate controls are in place to mitigate any hazards to acceptable levels and, when satisfied the activities are adequately covered by existing procedures, authorize the work to proceed. Authorizing individuals may request more information from the requestor, assistance from the ES&H disciplines, facility or program manager and/or others, and can initiate further review. Where possible, the authorizing individual will inform the requestor within three working days if more information or an expanded review is required.

As the authorizing individual (C&MS Division Leader or Facility Manager), your signature signifies that you have reviewed the activity and are satisfied it will be conducted safely and within the ES&H envelope described in applicable procedures such as the Facility Safety Procedure or Health and Safety Manual. As the authorizing party, it is also your responsibility to inform the Facility Manager, Health and Safety team, and the C&MS Environmental Officer of activities you have authorized (copy of the PWP). Concurrence is not required for work begin unless you have determined further review is required and have requested assistance in resolving issues. Authorizing individuals are responsible for keeping a record of PWPs and activities they have authorized.

C&MS Project Work Plan
Version 2.1a
Jan 15, 1997

I.
Date:

		PWP No.
Responsible Person		**Extension:**
Experiment Title		
Experiment Location		

A. **Experiment Description** (Attach a copy of a proposal, if you wish. A picture is always useful)

II. Health and Safety

A. Do you think that controls for the hazards in this experiment are given in an FSP or H&S Manual?

No ☐ **Yes** ☐ Which one? _____

B. **Review the hazard(s) in your experiment** The following examples are not meant to be a complete list, but illustrate hazards that might be present

- ☐ High-energy sources (large electric current, high energy capacitors, high magnetic field, high pressure gas or liquid, high voltage, lasers, etc.)
- ☐ Ionizing radiation (X-ray generator, radiological materials, sealed sources, etc.)
- ☐ Explosive or unstable materials
- ☐ Irritants
- ☐ Flammable, combustible, or pyrophoric materials
- ☐ Oxidizers, corrosives, or water reactive chemicals
- ☐ Carcinogens, mutagens, or teratogens
- ☐ Unusually toxic or reactive materials (e.g., beryllium, alkali metal powders, explosives, fluorine, silane, arsine, cyanide compounds, diborane, ricin, etc.)
- ☐ Physical hazards (e.g., RF/microwaves, high noise, high temperature, cryogens, cranes, forklifts, heavy equipment/materials, etc.)
- ☐ Human fluids (blood, urine, fecal matter, mucous matter, etc.) or biological agents

C. Describe the hazards (e.g. list of chemicals, details of high-energy or physical hazards, etc.)

D. What controls will be used to reduce the risks of each hazard in your experiment? (Identify the controls for each hazard, as identified in the FSP, the LLNL *Health & Safety Manual*, or the LLNL *Environmental Protection Handbook.*)

III. Staffing and Training

A. If staff members have been identified, please indicate their names and the hazards to which each might be exposed.

Name	Hazard(s)

IV. Environmental Impacts (NEPA and RCRA Evaluation)

A. Estimate the composition, concentration, and volume of hazardous wastes you will be generating (quantity/time).

Waste	Quantity/time

B. Will you be discharging effluents to:

	No	Yes	What and how much? (Quantity/time)
The atmosphere (via a fume hood or evaporation)			
The retention system			
The sanitary sewer			

V. Facilities

A. Describe new equipment you will be installing or room modifications you will be making. (If you are making facility changes, permission of the Facility Manager is required before any changes or construction can occur).

B. Describe any compatibilty issues that may affect nearby experiments (e.g. magnetic fields, radiation sources, etc.)

VII. Project Management

A. What account number(s) are funding this work (if known) or Directorate sponsoring work?

B. Do sufficient resources exist to complete the project (including training, startup, shutdown, cleanup, etc.)?

VI. Maintenance and QA

A. What equipment needs regular maintenance, inspection, certification or calibration to protect the employee, public, or environment and to assure the quality of your project results?

B. What are the QA requirements for your project?

VII. Review:

A. The following items should be considered by the reviewer:

Is activity appropriate for a C&MS facility
Environmental review
Training reviewed
Impact to facility
Impact to nearby experiments
Seismic safety issues
Personnel identified
Property management issues
Funding issues
Type of pre-start review required

B. Conditions for starting work (i.e. validate training, inspect workplace, receive funding, etc.)

VIII. Authorization:

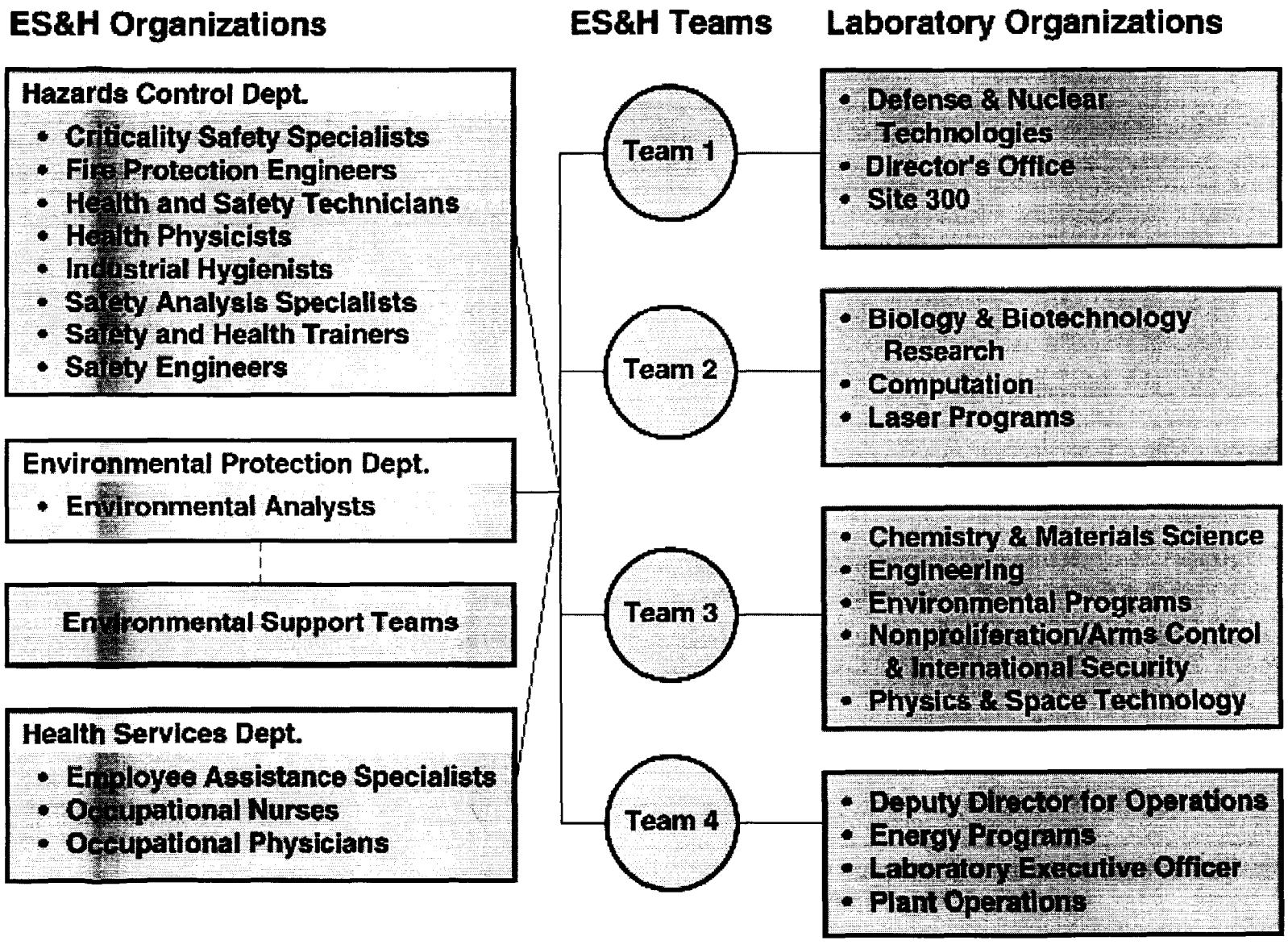
By signing this PWP, I am certifying that in my judgment, the significant environmental, safety, and health hazards of activities decried in this PWP have been identified, are mitigated by the appropriate controls, that there is negligible impact to the facility and the environment, and that the work falls within approved safety procedures. My signature authorizes work to begin on the activities described in this PWP.

Authorizing Individual (Print)	**DL DDL ADFM** Title (Circle)	Date

Signature

cc:

AD Facility Manager	L-353
Health and Safety Team 3	L-143
C&MS Environmental Officer	L-353


ES&H Organizations
ES&H Teams
Laboratory Organizations
Hazards Control Dept.
• Criticality Safety Specialists
• Fire Protection Engineers
• Health and Safety Technicians
• Health Physicists
• Industrial Hygienists
• Safety Analysis Specialists
• Safety and Health Trainers
• Safety Engineers
Environmental Protection Dept.
• Environmental Analysts
Environmental Support Teams
Health Services Dept.
• Employee Assistance Specialists
• Occupational Nurses
• Occupational Physicians
Team 1
Team 2
Team 3
Team 4
• Defense & Nuclear Technologies
• Director's Office
• Site 300
• Biology & Biotechnology Research
• Computation
• Laser Programs
• Chemistry & Materials Science
• Engineering
• Environmental Programs
• Nonproliferation/Arms Control & International Security
• Physics & Space Technology
• Deputy Director for Operations
• Energy Programs
• Laboratory Executive Officer
• Plant Operations

Enhancing ES&H Performance: Additional Methods—1. Customize for Lab work

- Comprehensive Health Hazard Communication program

  chemical
  physical
  biological
  ergonomic

- Apply the same approach to all hazards

  ID hazards
  Train
  Label and post (door poster)

There is a separate presentation for labs v. shops

NOTICE

THE FOLLOWING HAZARDS ARE PRESENT IN THIS AREA

Building: Room:

☐ Ionizing Radiation	☐ Carcinogens, Acutely Toxic, or Reproductive Hazards	☐ Moving Machinery
☐ Radioactive Materials Management Area	☐ Explosives	☐ Electrical Sources
☐ Flammables	☐ Biohazards	☐ High Pressure
☐ Reactive Chemicals	☐ Other: List _____ _____ _____	☐ High Noise

- Special Hazards and Precautions:

☐ Eye Protection Required	☐ No Eating, Drinking, or Smoking	☐ Other Precautions: _____ _____ _____

- Additional guidance for hazardous operations in this area is in the following safety procedures:

- Applicable OSHA Standard: ☐ Chemical Hygiene Plan ☐ Hazard Communication Program

- Material Safety Data Sheets (MSDS) for hazardous operations in this area are available in Building _____ Room _____ and through the MSDS Hotline at ext. 3-2122.

Additional information may be obtained from:

Responsible Individual: _____ Page: ____ Ext.: ____ Home Phone: _____

Alternate Facility Contact: _____ Page: ____ Ext.: ____ Home Phone: _____

ES&H Team Rep: _____ Page: ____ Ext.: ____

HWM Technician: _____ Page: ____ Ext.: ____ Date Prepared: _____

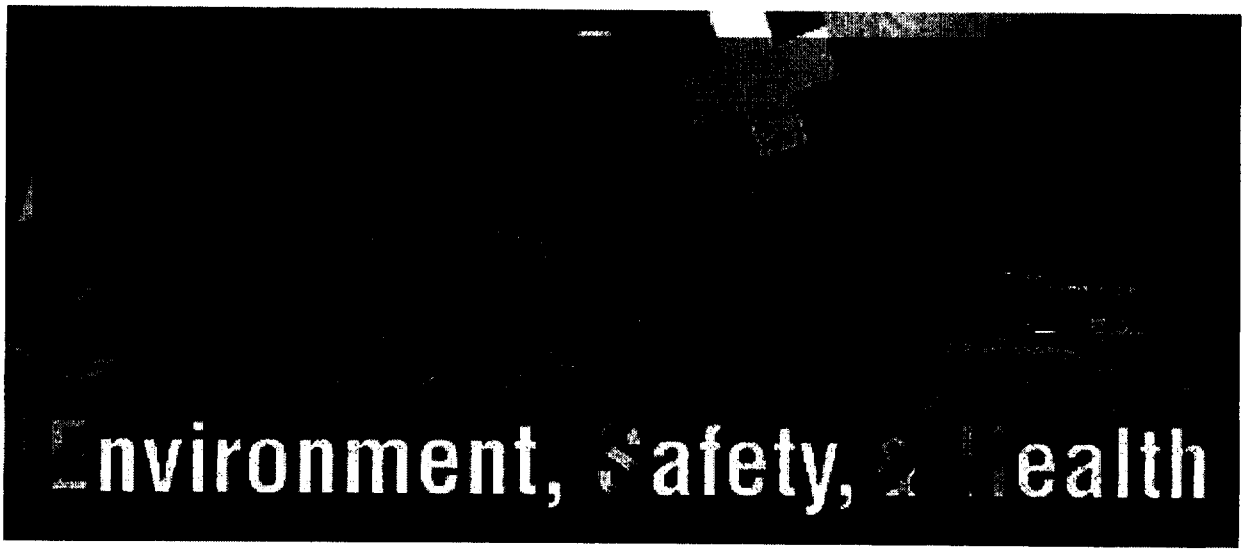
For off-shift support contact ext. 2-7595

LL 6389-1 (9/94) 7600-72714

Enhancing ES&H Performance: Additional Methods—2. Use on-line resources

- ES&H resources page
- Web manuals
- MSDS
- OSP
- Chemtrack (plan to add shelflife data and link to MSDS)
- Lessons Learned-promptly emailed to 500 supervisors

Example: C&MS home page



Environmental Compliance Manual	ES&H Program at LLNL	Organizations
Environmental Guidelines Documents	Health & Safety Manual	Training
Waste Acceptance Criteria Document	Lessons Learned	ES&H Bookmarks

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Last modified February 20, 1997
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UCRL-MI-118839

LESSONS LEARNED

February 7, 1996

Be Careful When Projects Scale Up

A recent LLNL occurrence report to DOE describes an incident involving Laboratory employees being exposed to formaldehyde exceeding ceiling limits specified by the American Conference of Governmental Industrial Hygienists (ACGIH). In this case, formaldehyde was being used in the development and preparation of carbon aerogel papers. Following the developmental phase, the project was scaled up by about a factor of 10 when it was decided to prepare approximately 3,000 carbon papers for another project at LLNL. It was during the exposure monitoring of the scaled-up phase that the higher exposure levels were discovered.

What Was Learned

Although the incident is still under review, several preliminary points seem clear.

- An assessment of the developmental phase showed that controls were appropriate for keeping exposures below standards.
- The need to upgrade controls for the production phase wasn't immediately recognized, based on the experience in the developmental phase.
- Controls used during the initial part of the production phase were insufficient to keep short-term exposures within allowable levels.

Recommended Action

1. When modifying existing procedures, carefully review changes in hazards to determine if controls are still effective, especially if changes are involved in the handling process or in quantities of hazardous materials.

2. Do not start work until the new hazard assessment has been completed and the necessary procedural controls are in place.

Where to Get Help or More Information

- ES&H Teams, ext. 28253
- "Overexposure of Two Employees to Formaldehyde During Carbon Aerogel Processing," SAN--LLNL-LLNL-1995-0069
- LLNL Health & Safety Manual, Chapter 2, "Integrating ES&H Into Laboratory Activities," see especially Section 2.3, "Performing the Activity"

Last modified September 30, 1996
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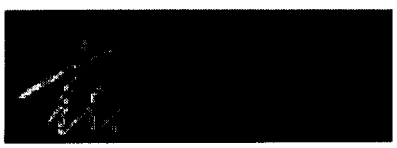
UCRL-MI-123367



C&MS Documents and Policies

Web Forms

NEW DEFTrak item closure form

Downloadable Forms

Project Work Plan (Word 6 format)
Lab/Office Transfer (Word 6 format)

Storage Locations of Management Documents

List of Management Documents

Directorate Documents and Policies by section

- **Personnel** *(100 Series)*
- **ES&H** (300 Series)
- **Facilities** *(400 Series)*
- **Property** *(600 Series)*
- **Financial Management** *(700 Series)*
- **Business Management** *(800 Series)*
- **Quality Assurance** (900 Series)

- **Memoranda of Understandings (MOU's)**

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http://www-cms.llnl.gov/llnl_only/CMS_Docs.html

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Administrative Information

ES&H Documents and Policies

- Storm Water Pollution Prevention Plan - Information about allowed releases

- CMS-96-303 : Project Work Plan (Word 6 format)
- CMS-94-304 : ES&H Management Plan
- CMS-305: ES&H Self-Assesment Program
- CMS-306 : Deficiency Tracking Implementing Procedure
- CMS-307 : Lockout and Tag Program Implementation Procedure
- CMS-309 : Waste Minimization and Pollution Prevention Plan
- CMS-315 : Visitor Safety
- CMS-94-322 : Occurence Reporting Procedure
- CMS-95-329 : Zone 4 Self-Help Activation Plan

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Enhancing ES&H Performance: Additional Methods—3. Use computer training

Web and Computer Based Training

- Web—
  - New Employee Orientation
  - Nonionizing Radiation
  - Pressure Safety
  - Electrical Safety
  - HHC for lab supervisors
  - HHC for shop supervisors
  - Draft: Be, HF, Pb, PPE

- CBT—
  - Fire Extinguishers
  - Chem Safety
  - Lab Safety
  - Laser safety

Training

Web-Based Training Courses @ LLNL

There's even an official report, UCRL-53868-95 pp 181-185, or you can view the preliminary write-up!!

The "official" URL for this page is "http://www-training.llnl.gov/wbt/". If you've used a different one, click HERE, before saving it as a bookmark. That way your bookmark will be valid longer.

Thanks!!

Take the following courses on the net, or escape the interruptions and call 3-1094 for an appointment to use our computers. For lecture and video courses, search the LLNL Course Catalog (your host must be in the llnl.gov domain). And, check the list of HC scheduled lecture classes.

HS0001New Employee Safety Orientation
HS0003 Hazards Control Orientation
HS4370 Non-Ionizing Radiation (Fields and Waves)
HS5030 Pressure Safety Orientation
HS5031 Pressure Safety Requalification
HS5040 Intermediate Pressure Safety
HS5050 High Pressure Safety
HS-5220 Electrical Safety
HS5245-R Lock and Tag Refresher
HS5230 High Voltage Safety in Research
HS5060 Pressure Seminar for Engineers
HS4050 Health Hazard Communication for Supervisors
HS4052 Health Hazard Communication for Supervisors of Chemical Labs- **Brand New!!**
HS0032 Preparing an Operational Safety Procedure- **Brand New!!**

For Computer Based Classes (CBT), call 3-1094 for an appointment:

HS1670 Fire Extinguisher
HS4240 Chemical Safety

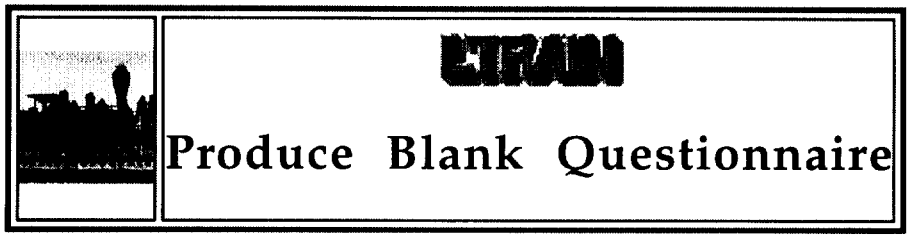
HS4246 Laboratory Safety
HS5200 Laser Safety
HS5310 Video Display Terminal
HS5620 Fork Truck Safety
HS6010 Radiological Worker Training
HS6300 Contamination Control

Here's the results of a load test on the webserver

Enhancing ES&H Performance: Additional Methods—4. Taking the L Train

L Train = Livermore Training Records and Information Network

A computer generated questionnaire matching job duties and required training



Person ID (badge number):

--OR--

Payroll Account

Display the following questionnaire information:

- ☒ Classes needed if question answered "Yes"
- ☐ Help in answering question
- ☐ Payroll accounts answering question "Yes"
- ☐ Job components for question (used in reporting)

Create Questionnaire | Reset Fields

When in Microsoft Word or other word processor, change the "View" option to "Outline" to see the questionnaire formatted hierarchically.

Sample of L Train Questionnaire

Y / N 01.09.: Do you work for the Hazards Control (HC) Department? (9660-9669)
Course:
HS0003 NEW EMPLOYEE ORIEN. HAZ. CONT.

Y / N 01.09.03. Do you perform work for the Technical Support and Policy Development Division (TSPD)?

Y / N 01.09.03.01.: Are you the Division or Deputy Division Leader?
Courses:
ED7020-MCBT Alcohol and Substance Abuse Prevention (A.S.A.P.) Education Program for Management
EM2010 Occurrence Reporting Requirements and Implementation
HS0005 Environment, Safety, and Health for Managers
HS0007 Incident Analysis
HS0095 Health and Safety for Employees and Visitors at Site 300

Y / N 02.04.: Are you matrixed to the Laser Program?
Courses:
LP9000 Laser Programs New Employee Environmental Safety and Health Orientation

Y / N 02.04.01. Are you a Metal Organic Chemical Vapor Deposition (MOCVP) Operator?
Course:
HS4630 Self-Contained Breathing Apparatus

Y / N 02.04.02. Do you handle hydrofluoric acid?
Course:
HS4200 Hydrofluoric Acid

Y / N 02.04.03. Do you transport, handle or work with chemicals outside of a chemical or biochemical setting?
Course:
HS4240 Chemical Safety

Y / N 02.04.04. Do you routinely work with laser dyes or clean up dye spills?
Course:
HS4242 SPECIAL TRAINING FOR TOXIC LASER DYE SOLUTION

Y / N 02.04.05. Do you work with chemicals in a chemistry or biochemistry laboratory?
Course:
HS4246 Laboratory Safety

Y / N 02.04.06. Do you work with Beryllium?
Course:
HS4255 Beryllium

Y / N 02.06.: Are you matrixed to Physics and Space Technology (PS&T)?

Y / N 02.06.02. Do you work with or near hydrofluoric acid?

Course:
HS4200 Hydrofluoric Acid

Y / N 02.06.03. Do you work with beryllium?

Course:
HS4255 Beryllium

Y / N 02.06.04. Do you work with toxic materials?

Course:
HS4220 Industrial Toxicology

Y / N 02.06.05. Do you work with chemicals outside a chemistry laboratory?

Course:
HS4240 Chemical Safety

Y / N 02.06.06. Do you work with alkali materials?

Course:
HS4260 Alkali Metals

Y / N 02.06.07. Do you work with or come into contact with lead including such operations as lead soldering?

Course:
HS4246 Laboratory Safety

Y / N 02.06.09. Do you work at off-site or remote loactions?

Y / N 02.06.09.02.: Do you work in the Mobile Atmospheric Research Laboratory (MARL)?

Courses:
HS1620 Medic First Aid
HS5040-W Intermediate-Pressure Safety
HS5200-CBT Laser Safety-CBT
HS5210 Capacitor Safety Orientation
HS5220-W Electrical Hazards Awareness-Web
HS5245 Lock and Tag Procedure

Y / N 17.: Do your responsibilities include the generation or management of waste or environmental cleanup?

Y / N 17.01.: Do you generate or handle hazardous, mixed or radioactive waste?

Course:
EP0006 Hazardous Waste Generation and Certification

Enhancing ES&H Performance: Additional Methods—5. Traditional observations are still important

A Special lab safety problem—injury from repetitive motion

- More lost time than from chemical spills and exposures
- Due to activities such as microscope use and pipetting
- Approach:

  -Evaluate job duties: work in lab, then go to office computer - no relief
  -Implement awareness training for workers and supervisors
  -New work procedures - breaks at regular intervals, exercises
  -Change equipment when possible - redesign tools, modify work benches

What is working?

- Incidents usually not advanced science exotic situations
  typically mundane—poor choice of PPE, mixing wrong materials, wrong rate or reaction

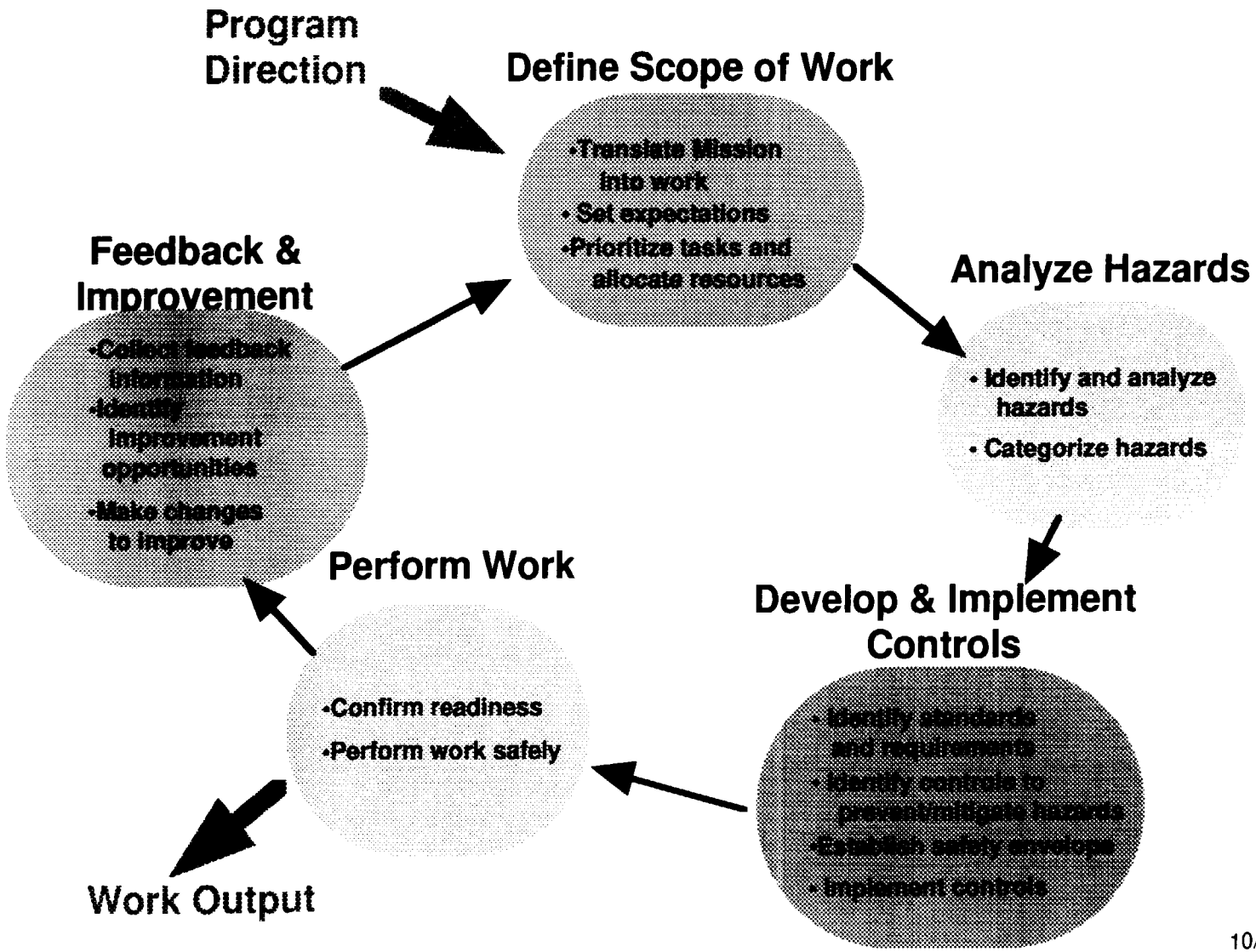
- Why
  tend to work hard on the new and unusual, apply lots of oversight and controls

  tend to disregard the commonplace or low status (waste chemicals)

- So, what's next for us?

  Increase
  - —sense of personal responsibility for safety
  - —the role of supervision
  - —easy access to tools
    (online training, reference material, lessons learned)

The recognized core functions of Integrated Safety Management are familiar to LLNL



DOE's five functions of ISM overlay onto LLNL's work process